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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YARON OSTROVSKY-BERMAN, HADAR PORAT, TIFERET AHAVAH GAZIT, and ORANIT DROR

Appeal 2015-002450
Application 12/781,836
Technology Center 3600

Before HUBERT C. LORIN, BIBHU R. MOHANTY, and BRADLEY B. BAYAT, *Administrative Patent Judges*.

BAYAT, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

STATEMENT OF THE CASE

Appellants[2] appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1–40. We have jurisdiction under 35 U.S.C. § 6(b).

SUMMARY OF DECISION

We REVERSE.

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[1] Our decision references Appellants' Appeal Brief ("Appeal Br.," filed Sept. 1, 2014), Reply Brief ("Reply Br.," filed Dec. 22, 2014), and the Examiner's Answer ("Ans.," mailed Oct. 20, 2014).

[2] Appellants identify "Carestream Health, Inc." as the real party in interest (Appeal Br. 2).

THE INVENTION

Appellants' claimed invention relates to medical imaging segmentation, and more particularly, "to segmentation of blood vessels and blood vessel networks in medical imaging applications" (Spec. 1:15–17). Claim 1, reproduced below, is illustrative of the subject matter on appeal.

> 1. A method of analyzing structure of a network of vessels in a medical image, comprising:
>
> receiving the medical image depicting the network of vessels;
>
> obtaining a mask of the network of vessels in the image;
>
> generating a graph, comprising points connected by edges, mapping a plurality of paths of vessels in the network to directed paths in the graph, with each edge in the graph either directed to indicate a known direction of flow in the corresponding vessel, or undirected to indicate a lack of knowledge of direction of flow in the corresponding vessel, and with all directed edges in a path directed in a same direction as the path; wherein said generating comprises generating in the graph at least two different paths connecting a same pair of the points, the two different paths constituting an undirected cycle, and wherein a computer or other device is programmed to carry out the method.

THE REJECTIONS

The Examiner relies upon the following as evidence of unpatentability:

Sun	US 2006/0159342 A1	July 20, 2006
Cao	US 2007/0165917 A1	July 19, 2007
Schneider	US 7,397,937 B2	July 8, 2008
Gulsun	US 2008/0187199 A1	Aug. 7, 2008

The following rejections are before us for review:

1. Claims 1–40 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

2. Claim 40 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Appellants regard as the invention.

3. Claims 1, 10, 12–30, and 33–39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cao, Gulsun, and Sun.

4. Claim 40 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Gulsun.

5. Claims 2–9, 11, 31, and 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cao, Gulsun, Sun, and Schneider.

ANALYSIS

Non-statutory Subject Matter

The Supreme Court has set forth "a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice*, 134 S. Ct. 2347, 2355 (Fed. Cir. 2014) (*citing Mayo*, 132 S. Ct. 1289, 1294 (Fed. Cir. 2012)). According to the Supreme Court's framework, it must first be determined whether the claims at issue are directed to one of those concepts (i.e., laws of nature, natural phenomena, and abstract ideas) (*id.*). If so, a second determination must be made to consider the elements of each claim both individually and "as an ordered combination" to determine

whether the additional elements "transform the nature of the claim" into a patent-eligible application (*id.*).

To that end, with regard to the first part of the Alice inquiry, the Examiner finds that the claims are directed to "the abstract idea of imaging data collection and of collaborative activity that can include financial aspects (i.e. cost function)" and therefore ineligible subject matter under 35 U.S.C. § 101 (Ans. 24). With regard to the second part of the *Alice* inquiry, the Examiner determines that the "additional claim element(s) do not provide meaningful limitation(s) to transform the abstract idea into a patent eligible application" (*id.*). The Examiner has applied this analysis to all the claims in the rejection.

Appellants argue that the invention is rooted in medical imaging technology — specifically automatic image segmentation — and has nothing to do with business practices (Reply Br. 5–6). According to Appellants, "[a] human expert, who segments a medical image manually, would never go through performing the tedious formal steps of a segmentation algorithm that satisfies the limitations of claim 1, 36, or 40, or go through performing the formal steps of an algorithm at all" and thus "is in contrast to the methods of the claims rejected in the *Alice* decision, which would be done in essentially the same way, whether done by a computer or by a human being" (*id.* at 6).

Appellants' arguments are persuasive.

Claim 1 is focused on a specific asserted improvement in automatic image segmentation, i.e., the automatic generation of a graph that maps paths of vessels in a network obtained from a medical image. "The

computer here is employed to perform a distinct process to automate a task previously performed by humans." *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314 (Fed. Cir. 2016). Like the automatic animation technique in *McRo*, "the automation goes beyond merely 'organizing [existing] information into a new form' or carrying out a fundamental economic practice." *Id.* at 1315 (quoting *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014)). Here, the invention provides a solution to a technological problem in image segmentation that is less sensitive to noise, prevents inclusion of erroneous paths in the network, and prevents elimination of correct paths in the network. *See* Spec., pp. 11–12.

The invention here is also distinguishable from recent decisions finding inventions in the field of image analysis ineligible. For example, in *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass'n*, 776 F.3d 1343, 1349 (Fed. Cir. 2014) the invention utilized a "generic optical character recognition technology, which [patent owner] conceded was a routine function of scanning technology at the time the claims were filed." In contrast, the invention here provides an asserted improvement over conventional vessel network recognition technology.

Accordingly, we do not sustain the rejection under 35 U.S.C. § 101.

Indefiniteness

Regarding claim 40, the Examiner finds that the claim phrase "a sufficiently long region of sufficiently low local cost to bring the risk score down to the minimum value" is indefinite because it "is not defined by the

claim, the [S]pecification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention" (Ans. 2, 27–28).

Appellants dispute this rejection (Appeal Br. 22; Reply Br. 4–5). We are persuaded by Appellants' argument that claim 40 sets forth specific criteria for determining sufficient region length (Appeal Br. 22).

Thus, we do not sustain the rejection of claim 40 as being indefinite.

Obviousness

Claims 1–39

Independent claim 1 requires, *inter alia*, "generating in the graph at least two different paths connecting a same pair of the points, the two different paths constituting an undirected cycle" (Appeal Br. 24, Claims App.). Independent claim 36 contains a similar limitation.

The Examiner finds the above limitation disclosed in Figure 4 and paragraph 21 of Sun (Ans. 4, 12, 26).

Appellants dispute this finding and contend that the graph shown in Figure 4 of Sun is used to identify boundaries and does not describe a "graph mapping the paths of vessels in [a] network" (Appeal Br. 10; Reply Br. 3).

We are persuaded by Appellants' arguments. A rejection based on § 103 clearly must rest on a factual basis. The Examiner has the initial duty of supplying the factual basis for the rejection and may not resort to speculation, unfounded assumptions, or hindsight reconstruction to supply deficiencies in its factual basis.

The graph depicted in Figure 4 represents a boundary around an object to be extracted from an image (*see* Sun, paras. 28–30). Paragraph 21 discloses that segmentation involves "a weighted undirected graph G" where each node "uniquely identifies an image point in P." We see no disclosure in Figure 4 or paragraph 21 of finding any paths or cycles in the graph.

Thus, we fail to see and the Examiner does not adequately explain how Sun discloses the "two different paths" as required by claim 1.

Accordingly, we do not sustain the rejection of independent claims 1 and 36 as obvious over Cao, Gulsun, and Sun. For the same reasons, we do not sustain the rejections of dependent claims 2–35 and 37–39. *Cf. In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) ("dependent claims are nonobvious if the independent claims from which they depend are nonobvious").

Claim 40

Independent claim 40 requires, *inter alia*, a "voxel risk score . . . decreasing when the local cost function is negative . . ." and "losing memory of any region of high local cost encountered earlier, after it has traversed a sufficiently long region of sufficiently low local cost to bring the risk score down to the minimum value." (Appeal Br. 30, Claims App.).

The Examiner finds the above limitation disclosed in Figure 8 and paragraphs 21 and 55–57 of Gulsun (Ans. 14, 27). According to the Examiner, "Gulsun does not disclose positive or negative cost function" but determines that it would have been obvious "to use robust vessel tree

modeling as taught by Gulsun ('199; abstract) in order to generate the cost function" (Ans. 14).

Appellants dispute this finding and contend that "Gulsun does not suggest having a risk score that ever forgets part of the past history of the local cost over the path expansion" (Appeal Br. 18).

Appellants' arguments are persuasive. Paragraph 21 of Gulsun discloses finding "a minimum-cost path between the first and second seed points by computing a cost of edges," and paragraphs 55–57 disclose a "cumulative cost measure." However, we see no disclosure in Gulsun of "losing memory of any region of high local cost encountered earlier" and the Examiner does not adequately explain how such a modification would have been obvious.

Accordingly, we do not sustain the rejection of claim 40.

DECISION

The Examiner's decision to reject claims 1–40 under 35 U.S.C. § 101 is reversed.

The Examiner's decision to reject claim 40 under 35 U.S.C. § 112, second paragraph, is reversed.

The Examiner's decision to reject claims 1–40 under 35 U.S.C. § 103(a) is reversed.

REVERSED